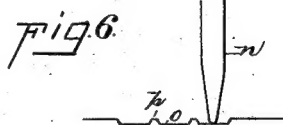
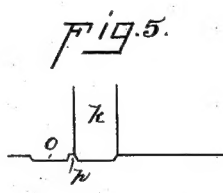
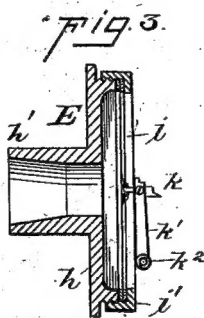
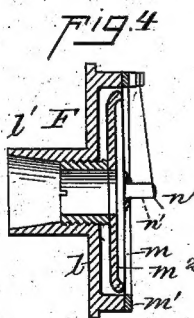
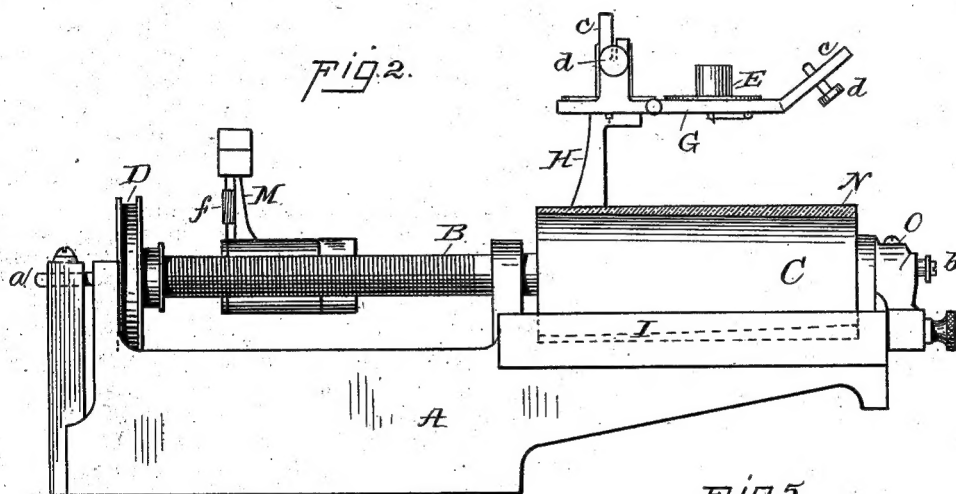
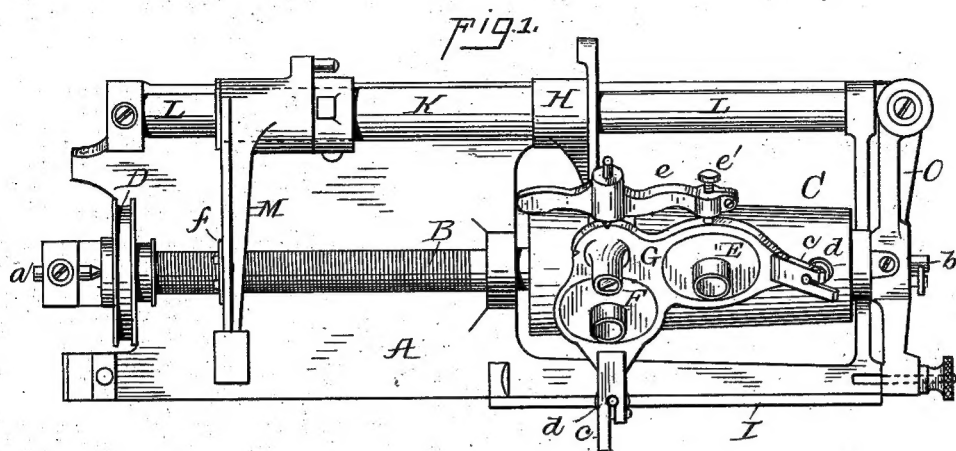


(No Model.)

T. A. EDISON.
PHONOGRAPH.

No. 400,647.

Patented Apr. 2, 1889.



Witnesses.
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William P. Zier

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UNITED STATES PATENT OFFICE.

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PHONOGRAPH.

SPECIFICATION forming part of Letters Patent No. 400,647, dated April 2, 1889.

Application filed July 7, 1888. Serial No. 279,320. (No model.)

To all whom it may concern:

Be it known that I, THOMAS A. EDISON, a citizen of the United States, residing at Llewellyn Park, in the county of Essex and State of New Jersey, have invented a certain new and useful Improvement in Phonographs, (Case No. 782,) of which the following is a specification.

I have found it desirable in my phonograph to use separate instruments for producing the record and for reproducing it, since if the reproduction of the sounds were made by the recording-instrument the record would soon be obliterated.

The object I have in view is to produce such a construction of phonograph that the reproducer can be readily adjusted to the record. This I accomplish by making the reproducing-point of less width than the recording-point, so that the reproducer will have a certain margin for adjustment, the sounds being reproduced if the point of the reproducer touches the bottom of the track of record at any point.

I prefer to mount the reproducer in the machine so that it can be adjusted laterally or across the track of the record, and I also prefer to provide each machine both with a recorder and a reproducer; but it is obvious that the elasticity of the reproducing-point may be depended upon to give a lateral adjustment, and it is further obvious that separate machines might be made for recording and reproducing.

The provision of means for permitting or securing the adjustment of the reproducing-point to the record is more especially made necessary by the employment of removable phonogram-blanks, which after the record is produced on them are removed from the machine and used for reproducing the sounds upon the same or another machine, since every record may require a different adjustment of the reproducer and so may the same record in removing the blank from the machine and again placing it in position thereon.

In the accompanying drawings, forming a part hereof, Figure 1 is a top view of a phonograph embodying my invention. Fig. 2 is an elevation of the same machine from the front,

showing the rocking holding-arm thrown back and the phonogram-blank in section. Figs. 3 and 4 are respectively sections of the recorder and reproducer; and Figs. 5 and 6 are exaggerated views of the points of the recorder and reproducer, respectively, showing the recording-surface in section.

A is the frame of the machine, upon which is mounted in centers *a b* a shaft, B, which carries on one end the phonogram-cylinder C, forming the carrier for the phonogram-blank. This phonogram-cylinder is preferably given a slight taper on its external surface, adapting it to receive and hold the removable phonogram-blank. The shaft B is provided with a wheel, D, through which the shaft is turned by connection with any suitable source of power, which may be an electric or spring motor or hand or foot movement.

E and F are the recorder and reproducer. These are held by a spectacle-frame, G, which is pivoted on the end of the rocking holding-arm H.

The recorder and reproducer, which will be presently described more in detail, are removably held in the eyes of the spectacle-frame and are adapted to be brought alternately into operative relation with the removable phonogram-blank by the swinging of such spectacle-frame to the right or to the left. Each eye of the spectacle-frame is provided with a finger, *c*, having a set-screw, *d*, therein, which set-screws rest alternately upon a guide-rest, I, which is mounted upon the frame of the machine in front of the phonogram-cylinder and parallel with its axis. The head of the rocking holding-arm has a laterally-extending arm, *e*, provided with an adjusting set-screw, *e'*. When the reproducer is swung into position, the eye of the spectacle-frame carrying it is limited in its movement by the set-screw *e'*, and by the adjustment of this set-screw the reproducing-point is adjusted laterally across the track of the record and is thereby brought into the best operative relation with the recording-surface. The rocking holding-arm is attached to a sleeve, K, which is mounted upon a stationary rod, L, supported upon the frame in the rear of the phonogram-cylinder and the shaft and parallel

therewith. At the other end of this sleeve K is a guide-arm, M, having a toothed block, *f*, on its free end, which engages with a fine screw-thread cut upon the shaft B between cylinder C and wheel D. This screw-thread feeds the recorder or reproducer lengthwise of the phonogram-cylinder while such cylinder is being turned through the medium of the shaft B and the power applied thereto. By throwing the rocking holding-arm back, as shown in Fig. 2, the phonogram-cylinder may continue to revolve without feeding the recorder or reproducer.

N is a cylindrical phonogram-blank, which is made of wax or other suitable material, and is preferably provided with a tapering bore, the taper being similar to that of the phonogram-cylinder, so that the blank can be pushed upon the cylinder and will hold itself by friction thereon, and can be readily removed therefrom, the center *b* being mounted on a swinging arm, O, to permit this to be done.

The recorder, Fig. 3, is composed of a plate, *h*, having a tube, *h'*, rising therefrom, to which is connected the speaking-tube of the instrument. The diaphragm *i* is clamped between this plate and screw-ring *i'*. The recording-point *k* is carried by the lever *k'*, which is secured to a long bearing-pin, *k²*, mounted in bearings on the sides of the ring *i'*. The recording-point passes through the lever *k'* and is secured by cement to the center of the diaphragm.

The reproducer, Fig. 4, is composed of a plate, *l*, similar to plate *h*, and having a similar tube, *l'*, to which the listening-tube of the machine is attached. The diaphragm *m* of the reproducer is held by the ring *m'*, which is screwed to the plate *l*, and a stretching screw-ring, *m²*, is provided for adjusting the tension of the diaphragm.

The reproducing-point *n* is a wire attached to the ring *m'* at one side and connected with the diaphragm by a block of rubber, *n'*, the point of the wire being turned down to engage with the surface of the record. The recording-point is made from flat plate-steel with its side edges slightly filed away, as shown in the exaggerated view, Fig. 5, the thickness of the steel plate being in my present phonograph about one one-hundred-and-fiftieth part of an inch.

Since my apparatus is designed to make about one hundred threads of the record to the inch, the recording-point must be slightly narrower than one one-hundredth part of an inch, in order to leave a ridge between the tracks of the record.

The reproducing-point is finished by filing the end of the wire down to a point and then burnishing off the extreme point and buffing such point so as to leave a rounded point, which is approximately about half as wide as the recording-point or one three-hundredth part of an inch.

The tracks of record on the phonogram-blank are shown by *o*, while the ridges between such tracks are shown by *p* in Figs. 5 and 6. Now, it will be seen that if the reproducing-point touches the bottom of the track of record, whether at either side or at the center, since the entire bottom of the track contains the indentations from one side to the other, the reproducer will reproduce the sound. The reproducer thus has a certain margin of adjustment, which enables it to be readily adjusted into the track of record, the best point of adjustment being determined by the ear of the operator.

What I claim is—

1. A phonograph having a reproducing-point narrower than the indentations forming the sound-record, substantially as set forth.

2. The combination, in phonographs, of separate recording and reproducing instruments, the reproducing-point being narrower than the recording-point, substantially as set forth.

3. In a phonograph, the reproducer having its point narrower than the indentations forming the sound-record, in combination with means for adjusting such reproducer laterally across the track of the record, substantially as set forth.

4. In a phonograph, the reproducer having its point narrower than the indentations forming the sound-record, in combination with a phonogram-blank carrier adapted to receive a removable phonogram-blank, substantially as set forth.

5. In a phonograph, the reproducer having its point narrower than the indentations forming the sound-record, and means for adjusting such reproducer laterally across the track of the record, in combination with a phonogram-blank carrier adapted to receive a removable phonogram-blank, substantially as set forth.

This specification signed and witnessed this 30th day of June, 1888.

THOS. A. EDISON.

Witnesses:

WILLIAM PELZER,
A. W. KIDDLE.